Cambrian and Avalon kliff notes--The term “Cambrian Explosion” refers to the appearance and rapid diversification of most major living animal body plans (phyla) in the fossil record within an interval of perhaps 20 million years or less, a relatively short period in evolutionary history. This time is known as the Early Cambrian, and began around 543 million years ago. This time interval is recorded by some spectacular fossil deposits that include superbly preserved fossils of these early animals. Two famous examples are the Burgess Shale in Canada, and the Chengjiang in China.1 Despite the claims of some, the Cambrian was not the beginning of multicellular animal life; the latter has a fossil record that extends back at least 30 million years earlier.2

The Cambrian Explosion is often posed as a challenge for evolution because the sudden burst of change in the fossil record appears to be inconsistent with the more typical gradual pace of evolutionary change. However, although different in certain ways, there are other times of very rapid evolutionary change recorded in the fossil record -- often following times of major extinction. The Cambrian Explosion does present a number of challenging and important questions because it represents the time during which the main branches of the animal tree of life became established. It does not create a challenge to the fundamental correctness of the central thesis of evolution, the descent of all living species from a common ancestor. This important period in the history of life extended over millions of years, plenty of time for the evolution of these new body plans (phyla) to occur. Furthermore, the fossil record provides numerous examples of organisms that appear transitional between living phyla and their common ancestors. The ongoing research about the Cambrian period is an exciting opportunity to advance our understanding of how evolutionary processes work, and the environmental factors shaping them. [or shaping our thoughts to a designers input]

The three successive evolutionary stages are represented by the **Avalon, White Sea, and Nama assemblages** (all named after localities where representative fossils of each stage can be found). The earliest Avalon stage was represented by relatively few species.

Although the phyla of most of these animals appear to have originated before the Cambrian Explosion, it was during this time that they announce themselves in rocks worldwide.

Fossil locales such as Chengjiang and the Burgess Shale show a world of animals hunting and killing and defending themselves with ever-more complicated claws and teeth and eyes and armor. This is different from the soft-bodied world that existed prior to the Cambrian. The world following the Cambrian Explosion is our world.

**The Cambrian and Ediacaran explosions present a massive problem for evolution because each records a wide variety of morphologies that come onto the scene practically immediately according to the fossils, with no identifiable ancestors. Darwinian evolution, on the other hand, would expect such widely disparate body plans to emerge only after a long geological history.****[6](http://creation.com/ediacaran-explosion" \l "endRef6) No known or accepted mechanism can account for such rapid evolution.**

**What’s worse is that the Cambrian and Ediacaran explosions bear no relationship at all to one another. Therefore, this sort of ‘evolutionary explosion’ had to happen twice. Once stretches credulity to breaking point—twice blows it out of the water completely.**

The sudden appearance of this diverse assemblage of Ediacaran biota, of course, provides no problem for a creationist understanding of the fossils. They are simply another grouping of organisms that were overwhelmed and fossilized by the Flood.[7](http://creation.com/ediacaran-explosion" \l "endRef7),[8](http://creation.com/ediacaran-explosion" \l "endRef8)

Therefore, the major body plans of animals all had to evolve very quickly, which is stretching the bounds of plausibility

**Darwin reckoned that there should be long and hidden periods of animal evolution before the Cambrian Explosion,** **Explosions of diversity in the evolution of life were of concern to Charles Darwin, who expected evolution to happen at a constant pace over long periods of time.**

**, proposing that dramatic environmental changes must have opened up new niches for natural selection to operate upon. These proposals include the runaway glaciation theory,11which proposes that glaciers briefly covered much of the earth, and the resultant loss of habitat created bottlenecks where evolution could act more rapidly. Another theory suggests that a change in atmospheric oxygen led to this sudden burst in evolutionary changes.12 Yet another proposal is that major changes in the seafloor, from algae mat-covered surfaces in the late Precambrian to soft muddy bottoms later in the Cambrian, had dramatic evolutionary and ecological impacts.13**

**The fossil record is notoriously incomplete, particularly for small and soft-bodied forms**.

. In fact, the Tree of Life is a metaphore for what is actual a forest of trees. Still, major mysteries are likely to persist, given the amazing ability of nature to splice, dice, reassemble, swap, amplify, and silence or re-use nucleid acid sequences within the genome of living organisms.

Such estimates of ancient divergence times could contain substantial error caused by uncertainty of the molecular clock assumptions, confounding effects of horizontal gene transfer, and errors in estimating sequence homology (i.e., similarlity). Consequently, attempts to date evolutionary branchings with molecular clocks have resulted in widely different estimates among researchers.

The debate persists today about whether the evolutionary "explosion" of the Cambrian was as sudden and spontaneous as it appears in the fossil record. The discovery of new pre-Cambrian and Cambrian fossils help resolve the debate, as these transitional fossil forms support the hypothesis that diversification was well underway before the Cambrian began. More recently, the sequencing of the genomes of thousands of life forms is revealing just how many and what genes and the proteins they encode have been conserved from the Precambrian. The explosion of external form (the phenotype) in the fossil record is what we see now, but more gradual adaptation was taking place at the molecular level (the genotype).